V. *On the* Butterflies *of Bulgaria.* By Henry John Elwes, F.R.S., F.L.S., etc.

[Read April 4th, 1900.]

Plate IV.

No country in Europe has been so little explored from an entomological point of view as the great central mountain range which forms the southern frontier between East Rumelia, Bulgaria and Macedonia, and is known at its northern end in Turkish as the Rilo Dagh, or in the Sclav. languages as Rilo Planina, and farther south and east as the Rhodope Mountains, or Despoto Dagh.

As far as I know the only collector of Lepidoptera who has ever been there is Herr Josef Haberhauer, who in 1861 and 1862 collected in the Balkans, and whose collections are described by Lederer in the Wiener Monatschrift, 1863, p. 17. Haberhauer has for the last few years resided at Slivno in East Rumelia and has collected in that neighbourhood, but has published no catalogue of the Lepidoptera. He made a short trip to the Rilo Dagh about twenty-five years ago, but no account of what he collected there has been published, and he has now little recollection of what he found. Thirty years ago I made my first expedition to Bulgaria as an ornithologist, and published a catalogue of the birds of Turkey in conjunction with Mr. T. E. Buckley (Ibis, 1870, pp. 59 *et seq.*). When this year I found that Mrs. Nicholl, whose ardour in the pursuit of butterflies has been well shown by her recent journeys in Spain and Bosnia, was willing to join me I determined to revisit the country. As, however, I was unable to leave England till the middle of June, Mrs. Nicholl spent a fortnight with Herr Haberhauer at Slivno, and made a short trip to Rilo Monastir before I arrived at Sofia.* As I knew from former experience that camping out was the only way in which the higher mountains could be explored with any comfort we took tents and camp outfit from England, and though there are villages at the foot

* Mrs. Nicholl has given a good account of the journey in the Entomologist's Record for February and March 1900.

of the mountains where food can be procured, it is a very much more agreeable way of collecting Alpine species to be on the ground than to have to ride some hours daily over bad mountain paths and to put up with the dirt and insects usually found in Bulgarian villages. We quite expected, on account of the southern latitude of these mountains, which are little north of 42°, to experience a hot and dry climate, but were surprised to find that on the north and east slopes at any rate the climate was, in the summer of 1899 at least, both cooler and more rainy than in any part of the Swiss, Italian or Austrian Alps which I have visited, and though snow lies in patches on the highest northern slopes of the mountains, whose culminating peak, Mus-alla, is a little over 9600 feet, there are no snow-fields of any extent or glaciers. The general character of the flora as well as the birds are more northern, and indicate a colder and damper climate than any mountain range so far south in Europe with which I am acquainted.

Leaving Sofia on June 21st we skirted the high Vitosch mountain, which lies just west of the town, and drove over a low pass to Samokov through a country which did not appear from an entomological point of view very attractive, the plains being cultivated and the hills overrun with sheep and pigs. At this town we found decent lodgings in an inn, and hired horses to go to Rilo Monastir, which is a large ancient monastery lying in a very beautiful wooded valley in the middle of the mountains. It can be reached in one day's hard riding from Samokov, as Mrs. Nicholl returned that way in one day, but owing to delays caused by bad roads and bad weather we were four days on the road, and found in crossing the pass, which is nearly 7000 feet high, that we were too early for most of the Alpine species.

When we got down to the monastery, however, which is at an elevation of about 4000 feet, we found a good many species of butterflies out, and I can recommend this place as a good centre for any one unprovided with tents, as it can be reached on wheels from Sofia *viâ* Dubnitza, and the monks are very hospitable. The valley is deep and heavily timbered in most parts up to about 6000 feet with pine, fir and beech, the slopes above that being grassy and running up into rocky peaks and crags which are the home of the chamois. The forests in the more inaccessible

valleys are almost virgin, though sawmills are creeping up them wherever a road passable for pack-horses can be kept open without too much labour. Though the monastery owns large numbers of sheep and horses the mountains are not grazed nearly so hard as in most parts of Bulgaria and Turkey, and in consequence there are many good-looking collecting-places which in the Alps would swarm with butterflies.

For some reason, however, which I cannot explain, though an abnormal season may to some extent account for it, we never once either then or later found butterflies in such abundance as in many parts of the Alps, and though as our list shows a large proportion of the Alpine species are present, yet many more which should accompany them are seemingly quite wanting. Bad weather hindered our work very much, and on very few days we were able to get more than two or three hours' unbroken sunshine, whilst several days were entirely lost through heavy rain.

We had hoped to extend our trip from Rilo Monastir into Macedonia, the frontier of which is close by, and to reach the southern and presumably warmer and earlier slopes of the range; but the political aspirations of the Macedonians, which have caused considerable unrest and friction between the Turkish and Bulgarian governments on this frontier, made our application for leave to visit Macedonia useless, and after waiting a week at the monastery we went into camp on the pass between it and Samokov. Here we had two days of fine weather, and got, among other things, *Melitæa cynthia*, which here finds its southern limit. After a few days we returned to Samokov, where Herr Haberhauer, having hurt his leg, was obliged to leave us, and through the kind help of Dr. Clark and Mr. Thompson, who have a large and apparently thriving mission here, obtained the services of a young Bulgarian, Radomir Kezantchieff, as interpreter. Five miles from Samokov is a newly-established watering-place called Camkuriya, close to high mountains and good collecting-ground, and though not above 4000 feet elevation it might be made a good centre for excursions.

From here we went up into the mountains east of Mus-alla and camped near the source of the Maritza, close to the watershed, intending to travel along the frontier as far as Batak. Here we found an *Erebia* which neither

Mrs. Nicholl nor I could name, but which appears to be most nearly allied to *E. gorgone*, a Pyrenean species not found in the Alps. We were in hopes of finding some limestone mountains in this neighbourhood, but failed to do so, granite seeming to be the principal formation in the district. From the high peaks near our camp when the clouds cleared off, which was seldom, we could see the high range of Perim Dagh in Macedonia and a large tract of mountainous country to the west and north of us, whilst the southern slopes of the Balkan range looking, as they are, lower, drier, and less wooded than Rilo Dagh, were visible to the north-east.

Bad weather dogged our steps for a whole fortnight, and though by making the most of every gleam of sunshine we gradually accumulated a fair number of Lepidoptera, yet we were quite unable to get a series of the supposed new *Erebia* or to find the female at all.

We then descended to a place called Kostenetz, where a small and very humble bathing-place is newly started, and where we got a few low-country butterflies not hitherto taken; but though Mrs. Nicholl was very unwilling to leave the district without a series including both sexes of her long-hoped-for prize, a new *Erebia*, we were at last obliged to go back to Sofia for money and supplies. Here letters arrived which obliged us to return home, and in order to see whether the Western Balkans were a promising field for future exploration we chose the road over the Ginci Pass *viâ* Berkovitza to Lom Palanka on the Danube instead of the usual route by rail to Belgrade. This is a pleasant drive of about one hundred miles, and produced eight or ten species not hitherto taken; but again we were overtaken by violent thunderstorms in the most promising part of the mountains, which here have rather the character of downs, and which extend for thirty or forty miles north of Sofia to the pass, where they fall sharply in steep beech-clad slopes to the valley of the Danube.

On descending into the great plain or rolling steppe country which lies between the Balkan and the river we found a great change in the climate and flora, for whilst the Rhodope had had too much rain the Danube Valley was nearly dried up and the harvest very scanty. We did not see any indications of a rich insect fauna in this part of the Balkan, though probably better collecting-ground may be found farther east in the neighbourhood of the

Trojan Pass and in the Rosalita Pass north of Kalofer. As far as I can judge from what I saw and heard there is, however, no really Alpine country in the whole range of the Balkans which does not anywhere rise to above about 7000 feet.

If I am able to revisit the country I should certainly prefer the Southern Rhodope and Macedonia, including Olympus, which, as far as I know, has been explored in recent times by no entomologist, and where a number of southern and eastern species which we did not see will almost certainly be found.

There is probably no region in Europe so likely to afford novelties as this, and it would be very interesting to see how far north the species extend which were found on the northern mountains of Greece by Kruper, and which have been described by Staudinger so ably in his work on the Lepidoptera of Greece (Horæ Soc. Ent. Ross, 1870).

The catalogue of the species found by us, which follows, comprises 121, to which may be added the following 20 found in the Balkan and Bulgaria by Haberhauer, and enumerated by Lederer in Wien. Ent. Mon., vol. vii, p. 17—

*Thais polyxena.**
Pieris brassicæ.†
Lycæna minima, hylas, telicanus, corydon.†
Thecla spini.
Satyrus hermione,† *circe, briseis,*† *actæa,* var. *cordula.*
Pararge roxelana.
Spilothyrus alcææ, altheæ.
Syricthus cynaræ, alveus, sao.
Hesperia lineola, acteon, comma.†

* His Highness Prince Ferdinand of Bulgaria discovered this species at Rilo Monastir in April 1900, and has reared specimens from the egg. The larva feeds on *Aristolochia parviflora.* These specimens are much smaller and whiter in the ground colour than those from the Balkans.

† Species so marked have been taken near Sofia by Prof. Bachmetjew. Since this paper was written Prof. P. Bachmetjew has given me a short catalogue published recently by him in the Society as *Entomologica* of the Lepidoptera of Sofia and its environs. This contains 72 butterflies, of which *Thais polyxena, Pieris brassicæ, Thecla acaciæ, Lycæna corydon, Vanessa xanthomelas, V. antiopa, Satyrus hermione, S. briseis, S. arethusa, S. statilinus, Epinephile lycaon, Spilothyrus altheæ, Syricthus alveus,* and *Erynnis comma* were not taken by us.

This makes the number at present known to occur in Bulgaria 141, as against 110 given in Staudinger's enumeration, compared with 131 known in Greece, which has been much more fully explored. The Greek species not yet found in Bulgaria are 30 in number, as follows—

Pieris krueperi.
Anthocharis gruneri, damone.
Colias heldreichi.
Rhodocera rhamni, cleopatra.
Thecla w-album, acaciæ.
Polyommatus ottomanus, thetis.
Lycæna bætica, balcanica, trochilus, argus.
Libythea celtis.
Charaxes jasius.
Vanessa egea, antiopa.
Danais chrysippus.
Erebia melas.
Satyrus amalthea, mamurra, arethusa, statilinus,* fatua.*
Epinephele ida.
Syrichthus proto, phlomidis.
Nisoniades marloyi.
Hesperia nostrodamus.

Of these the greater part will certainly be found in Bulgaria, as well as about twelve which are included in the list of Roumanian butterflies given by Caradja in Iris, vol. viii, pp. 1–62, as follows—

Colias chrysotheme.
Thecla betulæ, pruni.
Lycæna cuphemus.
Thestor nogelii.
Neptis aceris.
Vanessa xanthomelas, l-album.*
Melitæa maturna, arduinna.
Erebia æthiops.
Pararge clymene.

The total number of butterflies which have been hitherto found or which from their known distribution may be expected to occur in Bulgaria is thus as follows—

141 + about 20 of the 29 others which occur in Greece = 161 + 10 found in the Danube Valley = 171. Probably in the whole Balkan Peninsula something like

* Taken near Sofia by Prof. Bachmetjew.

180 to 200 species will be found, which compares favourably with about 130 in Spain, 200 in Italy, including the islands and Alps, and 200 in Asia Minor. None, however, unless we treat *Erebia gorgone* var. *rhodopensis* as a species, can be considered peculiar to Bulgaria.

1. *Papilio machaon*, L.

Not uncommon up to about 4000 feet.

2. *P. podalirius*, L.

A few seen in the low country. Common at Slivno.

3. *Thais cerisyi*, B.

Mrs. Nicholl took this abundantly at Slivno in the end of May, and also saw it in the Rilska Valley on the west side of the Rilo Dagh, which is the most westerly point where it has yet been found. The Slivno specimens are larger and the females paler in colour than in Asia Minor or the Caucasus.

4. *Parnassius apollo*, L.

Appeared about the beginning of July on dry slopes at about 3000—4000 feet, but not so common as in the Alps. The specimens are not in any way remarkable for size or markings.

5. *P. mnemosyne*, L.

Common on meadows near Rilo Monastir at the end of June at about 4000 feet, but not seen in the Maritza or Airandere Valleys.

6. *Aporia crataegi*, L.

Not uncommon at 3000—4000 feet in July.

7. *Pieris rapæ*, L.

Common at 3000—4000 and seen up to above 5000 feet, and showing a great deal of variation. Some of the females might be called *mannii*; but, as far as I can judge, this form is nowhere constant, and should be looked on as an aberration rather than a variety.

8. *P. napi*, L.

Rare in the mountains, and not seen below 6000 feet.

9. *P. ergane*, Hüb.?

Though we caught every small specimen of *rapæ* in hopes of getting this species, which is common in Montenegro and Greece, we got no specimen about which there can be no doubt. Some of the females were very near *ergane* in size, but all had the black spot on underside of the fore-wing which is wanting in *ergane* and present in *rapæ*. Mrs. Nicholl, however, got one at Slivno which I believe is *ergane*.

10. *P. daplidice*, L.

Only taken in the plains about Sofia and at Slivno.

11. *P. chloridice*, Hüb.

Local and not common at Slivno in early June.

12. *Anthocharis belia*, Esp.

Not seen in the Rilo Dagh, but taken at Slivno.

13. *A. cardamines*, L.

Nearly over when I arrived, but Mrs. Nicholl took it at Rilo and at Slivno.

14. *Leucophasia sinapis*, L.

Common at 3000—4000 feet. I believe that what I took belonged to the second generation.

15. *Colias myrmidone*, Esp., var.

We found this insect not uncommon from about 4000—5000 feet, flying on steep hillsides and in gorges, but never in the low country. It appeared at the beginning of July, so I cannot say whether there are two generations or not; but, if so, what we took was probably the first. The specimens, like those from Bosnia, average considerably larger, and are brighter in colour than those from Austria, and are fully equal in size and brighter in colour than the form found in the Southern Ural, which has been called *ermak* by Grum.

I have seen only one *myrmidone* from Hungary which could be mistaken for Bulgarian specimens. We were unable to take many females, as they were hard to catch on such steep and bush-covered ground as they

usually frequented ; but the white form was certainly more abundant than the orange, though Mrs. Nicholl found this was not the case in Bosnia, and in Austria the white female occurs as a rare aberration only. My orange female is very like that of *heldreichi* on the upper-side, but can be distinguished by the brighter colour below. *Heldreichi*, which has hitherto only been taken on the highest peaks of Veluchi, Chelmos, and Parnassus in Greece, at 7000—8000 feet, and has been treated as a var. of *aurorina*, seems to be more worthy of specific rank than many other so-called species of *Colias*.

The fact is, that in this genus, as in many others, wherever you find a butterfly restricted by geographical or physical conditions to an isolated locality, it is comparatively easy to recognize and define its distinguishing characters; but when you find a species whose greater powers of adaptation to varying conditions of food and climate enable it to exist over a wide area, then it often becomes impossible to define its local varieties. There is no evident reason why *myrmidone* should not extend its range to Greece, and we do not yet know whether *heldreichi* may not occur in the Southern Rhodope or Macedonia; but from a geographical point of view it would seem likely that *heldreichi* is more nearly allied to *myrmidone* than to *aurorina*, from which it is separated by wide areas of sea.

16. *Colias edusa*, Fabr.

Common up to about 5000—6000 feet, and always distinguishable on the wing from *myrmidone* by its paler colour.

17. *C. hyale*, L.

Not seen in the mountains, but common in the plains and at Slivno.

18. *Thecla ilicis*, Esp.

A few specimens were taken at about 4000 feet.

19. *T. quercus*, L.

Not seen in Rilo Dagh, but taken in the Balkans at the end of July.

20. *T. rubi*, L.

Nearly over when I reached the country, but Mrs. Nicholl found it common at Slivno.

21. *Polyommatus virgaureæ*. L.

Males were abundant on the meadows in the foothills and at Rilo Monastir, but females were not yet out by the middle of July.

22. *P. thersamon*, Esp.

Found at Slivno, where it was rare, and near Sofia at 3000 feet by Mrs. Nicholl.

23. *P. dispar*, var. *rutilus*, Wernb.

Mrs. Nicholl found this in the Struma Valley near Dubnitza, on June 7th, on marshy ground.

24 *P. hippothoë*, L.

Common in mountain meadows up to 5000 feet.

25. *P. alciphron*, Rott.

Not common in the Rilo Dagh. My only fresh male is small, of a paler colour than German specimens, like those from Florence (var. *intermedia*, Stefanelli). The female, however, is quite typical.

26. *P. dorilis*, Hufn.

Not common in wet Alpine meadows at 6000—7000 feet at the end of June.

27. *P. phlœas*, L.

Not common at 3000—4000 feet.

28. *Lycæna argiades*, Pall.

Taken at Sofia in June and Slivno in May.

29. *L. ægon*, S. V.

We took this sparingly in the lower parts of the mountains and up to about 5000 feet.

30. *L. zephyrus*, Friv.

A single male taken at Kostenetz, and was not recog-

nized by me at the time on account of its small size, but can, I think, belong to no other species. Haberhauer found it rare at Slivno.

31. *L. orion*, Pall.

Not common near Rilo Monastir in June; common at Slivno.

32. *L. baton*, Berg.

Found at Slivno, but not seen in Rilo Dagh.

33. *L. astrarche*, Bgstr.

Not uncommon at 3000—4000 feet.

34. *L. anteros*, Frr.

This was a common insect in the Rilo Dagh and Balkans from 4000 to about 5000 feet. The males are easy to recognize by their brilliant colour, but the females are sometimes easily confused with those of the last species. By the end of June it was difficult to find a fresh male, but the females were in some cases still fresh in the middle of July.

35. *L. eroides*, Friv.

I first found this in a meadow near Rilo Monastir on July 3rd, where it was rare; and on July 14th near Kostenetz at about 4500 feet it was commoner on a steep hillside among bushes. The male is easy to recognize by its bright blue colour, but the female is liable to be confused with that of *icarus*. I see no reason why this should any longer be treated as a var. of *eros*, which, as far as I know, is in Europe always an Alpine insect and constantly much smaller.

Eroides occurs, though it has not recently been taken, in some (to me unknown) locality in Prussian Poland, and also in the Balkans and at Sarepta. I believe that Frivaldsky also took it in Crete, but it is not yet recorded from Greece or from any part of the Carpathian Mountains.

36. *L. icarus*, Rott.

Common at the foot of the mountains. I found a very small variety of which the males were worn and the

females fresh on the northern foothills of the Balkans, and at first supposed it to be *L. candalus*, but Dr. Staudinger thinks that they are only starved specimens of *icarus*, and the great drought which prevailed in the Lower Danubian provinces during the last winter and spring would perhaps account for their uniformly stunted development.

37. *L. eumedon*, Esp.

Common at 5000—6000 feet in the beginning of July. The specimens are large, and most of them have the white streak on the hind-wing below faint or absent as in the var. *fylgia* of Spängberg. Mrs. Nicholl found both forms at Slivno.

38. *L. amanda*, Schn.

Not uncommon at 4000—5000 feet.

39. *L. escheri*, Hüb.

Rare at Rilo Monastir.

40. *L. bellargus*, Rott.

Taken at Slivno in early June, and also on the north slope of the Balkans in the end of July.

41. *L. meleager*, Esp.

Taken at Kostenetz in the foothills of the Rilo Dagh and in the Balkans at the end of July.

42. *L. admetus*, var. *ripartii*, Frr.

Taken on the Balkans, but not seen in Rilo Dagh.

43. *L. argiolus*, L.

Not uncommon in Kostenetz in the middle of July.

44. *L. sebrus*, B.

Two specimens from Rilo on July 6th at about 4000 feet.

45. *L. cyllarus*, Rott.

Taken at Slivno and near Rilo Monastir by Mrs. Nicholl, but not common.

46. *L. semiargus*, Rott.

The commonest and indeed the only *Lycæna* at high elevations in Rilo Dagh, where it was very common at 5000—7000 feet and perhaps higher. Most, but not all, of the specimens show on the hind-wing below the reddish marginal spots which are characteristic of the var. *parnassia*, Stgr., from Greece; but that is normally a small form, and all my specimens are large. The var. *helena* is an extreme development of the same.

47. *L. alcon*, S. V.

Not uncommon at about 3500 feet near Rilo Monastir.

48. *L. iolas*, Ochs.

Common at Slivno, but not seen in Rilo Dagh.

49. *L. arion*, L.

Also common at 3000—4000 feet.

50. *Nemeobius lucina*, L.

A few, mostly worn, of the first brood were taken late in June at Rilo; others were flying in bushy ground on July 25th in the plains north of the Balkans. These must belong to a second brood, but the species in most places seems to be only single-brooded.

51. *Apatura iris*, L.

Common near Kostenetz, the males fresh out on July 14th.

52. *A. ilia*, var. *clytie*, Schiff.

We did not take this in the Rilo Dagh, but it occurs at the foot of the hills, and was very numerous on the willows by the side of the road near Sofia on July 21st. Most of the specimens were by that time much worn.

53. *Limenitis populi*, L.

Occurred near Rilo Monastir at about 3000 feet, but not abundantly.

54. *L. camilla*, Schiff.

Only once taken at Kostenetz.

55. *L. sibylla*, L.

Commoner than the last at Kostenetz.

56. *Neptis lucilla*, F.

Also taken at Kostenetz, but not common.

57. *Vanessa c-album*, L.

Common near Kostenetz at 4000—5000 feet.

58. *V. polychloros*, L.

A single specimen near Sofia.

59. *V. urticæ*, L.

The only *Vanessa* seen in the mountains from 5000—7000 feet.

60. *V. cardui*.

Not abundant at the foot of the mountains.

61. *V. atalanta*, L.

Seen at Rilo and at the foot of the mountains.

62. *Melitæa cynthia*, Hüb.

Though this had previously been taken by Haberhauer twenty years ago, most likely in the same place where we found it, no published notice of its occurrence except in the Alps is known to me. At our camp on the pass between Samokov and Rilo Monastir, where we had almost the only fine days we experienced, a good series of both sexes was procured. The insect flies on steep slopes covered with long grass and juniper bushes at from 7000—8000 feet, and was in perfect condition during the first week in July. It flies rather rapidly and settles with its wings spread on the grass and junipers. Some larvæ were found on a coarse grass which must be its food plant, as the insects were never far from the places where this grass grew most luxuriantly. I see no difference in either sex between the Rilo and Alpine specimens, except that the fulvous band on both wings in the male above is more developed in Bulgaria, but I do not know that I could separate them if without labels.

63. *M. aurinia*, Rott.

Common at 5000—6000 feet in meadows. I do not see how it can be distinguished from the typical form, though according to Staudinger it should be the var. *provincialis*.

64. *M. cinxia*, L.

Common near Rilo Monastir in the middle of June; the females mostly very dark in colour.

65. *M. phœbe*, Knoch.

Not uncommon near Rilo Monastir.

66. *M. trivia*, Schiff.

A large form of this, very dark in colour, was common on some flowery hillsides among rocks at 4000 feet, near Rilo Monastir, in the end of June. Some of the females were almost melanic, others quite pale. There were also some remarkable aberrations among the males, but on the average they are larger and darker than those from any other locality whence I have specimens.

67. *M. didyma*, Ochs.

Not so common as the last.

68. *M. dictynna*, Esp.

A few were taken at about 5000 feet.

69 *M. athalia*, Rott.

Common at Camkuriya near Samokov, at Rilo Monastir, and generally at the foot of the mountains. The specimens are large and dark, like the so-called var. *mehadiensis*, Gerh.

70. *M. aurelia*, Nick.

Common. Found at the same elevation as *athalia*. Some of the females are hard to distinguish from those of *athalia*.

71. *Argynnis selene*, Schiff.

Common from 5000—6000 feet in marshy Alpine meadows. The specimens we took average smaller than usual in Europe.

72. *A. euphrosyne*, L.

The commonest butterfly in the wooded part of the mountains from 4000—6000 feet, and apparently one of the earliest to appear, most of the specimens being worn

at the end of June. Some of the females are very large, and dark in colour.

73. *A. pales*, Schiff.

Common in Alpine meadows and forest openings at 5000—6000 feet from the end of June. To my mind the variety found here, which agrees with specimens from Bosnia, is a transition form from *pales* to the variety found in the Greek mountains and figured by Staudinger in his list of the Lepidoptera of Greece (Horæ, 1870–71) as var. *græca*. Dr. Staudinger, to whom I sent a pair, says they are nearer to his var. *caucasica*, and assigns both *græca* and *caucasica* to *arsilache* rather than to *pales* on account of the black markings on the fore-wing below being well marked. But though my specimens are not so large and pale coloured as in typical var. *græca* they resemble it in having the ocelli on hind-wing below more distinct and regular than in any other form of *pales* or *arsilache*, and by this character I should know them from any central European *pales*. From the nature of their habitat I assign the form to *pales* rather than to *arsilache*, but the specific distinction of these two forms is yet unproved though very probable.

74. *A. dia*, Linn.

A few were taken at the foot of the mountains in July.

75. *A. daphne*, Schiff.

One was taken at Rilo by Mrs. Nicholl.

76. *A. ino*, Esp.

Not common near Rilo Monastir in bushy places.

77. *A. hecate*, Esp.

I took a single specimen at about 3500 feet.

78. *A. lathonia*, L.

Not uncommon.

79. *A. aglaia*, L.

Fairly common on the mountains.

80. *A. niobe*, var. *eris*, Meig.

Common at 3000—4000 feet.

81. *A. adippe*, L.

82. *A. paphia*, L.

Taken at Kostenetz in July.

83. *A. pandora*, Schiff.

Taken at Kostenetz at 3500 feet.

84. *Melanargia galathea*, L.

Common up to about 3500 feet; also at Slivno at 1500 feet early in June.

85. *M. larissa*, Hüb.

Mrs. Nicholl found this species common at Slivno at the beginning of June. The specimens are dark, very like some from Syria, but I have none from Greece or Dalmatia for comparison.

86. *Erebia epiphron*, var. *orientalis*, n. var.?

We found this pretty common in the Rilo Dagh at from about 5000 to nearly 7000 feet in the end of June and July, in company with *æme* and *medusa*, in places where long grass grew on sunny slopes.

On comparing it with a large series of various forms of this species from the Harz, Vosges, Styria and Pyrenees, I find that it comes nearest to the Pyrenean form in size and markings, but can be separated from it as well as from all others by the following characters—In the ♂ the band of the fore-wing above is less defined and the two lower ocelli constantly absent (though I attach little importance to this, as similar specimens occur rarely in other places). In many specimens there is a distinct chocolate stripe extending inwards from the apical ocelli which is characteristic of this form, and of which a trace is seen in one other specimen only (from the Sau Alpe in Styria). In the female, however, the difference is much greater, the ocelli above being ringed with white, and the ground colour below much more like that of *æme* ♀, having the ground colour greyish, pale marginal band very distinct, and the ocelli strongly ocellated with white points in the centre.

I have seen no similar females of *epiphron* from any place except two in Grum's collection marked "Alpes," which, if they do not come from Bulgaria, I am inclined to refer to *æme*. I caught *æme* females at the same time and place flying with their males in company with *epiphron*, and can easily distinguish them by their large size and the broader, more rounded wings, and, as I have shown below, this form of *æme* is different from the Alpine or Pyrenean one.

87, 88. *E. medusa*, F., and var. *psodea*, Hüb., and *E. æme*, Hüb. var.

Though these species were very abundant in the Rilo Dagh I have very great difficulty in deciding how to name many of the specimens, of which we took large numbers.

The form of *medusa* which Mrs. Nicholl took at Slivno in the early part of the season is a large form with large ocelli, usually five in number on the fore-wing, of which the third is the smallest, and often in the male obsolete or only represented by a point.

This form was also taken in the lower parts of the Rilo Mountains up to 4000 or 5000 feet, though not so large and well-marked as at Slivno.

It is usually known in collections as *medusa*, var. *psodea*, Hüb., or *cumenis*, Frr., and is considered by Staudinger as a form of *medusa*. It is the typical form in the Balkans in Podolia and Hungary, and occurs in the Alps and Germany as an aberration.

At a higher elevation in Rilo Dagh, up to say 7500 feet, a smaller form of *medusa* or *æme*, some of which might be called *hippomedusa*, Ochs, was common in company with a species of similar size, most like one which is common in the Alps of Styria in Bosnia and possibly elsewhere, and is known in collections as *æme*, var. *spodia*, Stgr. When taking this we could usually distinguish the males by the colour of the fore-wing below, which is tinged with the chocolate colour of the band, the lower part of which is indefinite and fades into the ground colour of the wing, whereas in *medusa* it is much more sharply defined.

The females are more easy to distinguish, as they have the same difference, and also as a rule have the ground colour of the wings more fulvous. There are some

specimens which are difficult to distinguish without having recourse to the genitalia, which agree very well with those of *medusa* and *æme*, and seem to me to prove that the two forms are distinct species. Dr. Chapman, to whom I sent specimens of both forms, says that he is able in all cases to distinguish them by the antennæ. In *medusa* the club is yellow-brown beneath, and in *æme* the same part is black.

Probably hybrids between the two occur.

89. *E. melas*, var.

A single specimen of this species taken on Belmecan, October 8th, was sent me recently by Radomir Kezantchieff, who returned to Kostenetz after we left in hopes of getting more specimens, including the female of *E. gorgone*. As his experience may be useful to other entomologists I give an extract from his letter.

He started for Kostenetz on August 9th, two weeks after we parted, the weather being just as rainy as when we left, and stayed a week in the valley of Airandere, at the gendarmerie hut, but owing to persistent rain and mist got only a few specimens. Then he returned to Kostenetz and ascended the mountain called Belmecan, 8600 feet high, where he found a great many of what he thought to be the same as *E. gorgone*, but not having a net with him was only able to take a few with his hands. Having found a good place to collect in he returned, but bad weather again set in, and lasted two weeks. All the specimens taken on these occasions were sent to me by post, but have been lost with the exception of *E. melas*.

90. *E. lappona*, Esp.

On the bare grass-covered tops and flatter slopes of the Rilo Dagh above 7000 feet, common, but most abundant at about 8000 feet, and the only *Erebia* which was found abundantly at high levels, though *medusa* and *æme* also occurred in the lower part of its range.

The first specimens were taken at the end of June, and continued to appear till the middle of July. On the average the specimens are larger and brighter, with the inner bands on the fore-wing above and the bands of the hind-wing below more strongly marked than in specimens from the Alps.

91. *E. tyndarus*, var.

We did not find this until the first week in July, when the males appeared at about 5000 feet in grassy places in the forest, but we got no females; whether it occurs at a higher elevation later in the season or not I cannot say, but Mrs. Nicholl got it in Bosnia at from 4000—5000 feet in the end of July, and found both typical specimens and a form which she called *balcanica* within 1000 feet of each other. Rilo specimens are considerably larger than Alpine, Pyrenean, or Asiatic examples, but not so large as var. *ottomana* from Greece and Asia Minor, and seem to form a transition to those varieties. On the underside they are like Bosnian specimens, with the bands indistinct, and often have on the hind-wing below a mixture of fulvous colour with the grey, and the ocelli well marked. I am not aware that any form of *tyndarus* has yet been taken in the Balkan Mountains.

92. *E. gorgone*, var. *rhodopensis*, n. var.

In the upper Maritza Valley on July 11th Mrs. Nicholl took the first specimen of what we supposed to be a new *Erebia*, and we afterwards found four more males in the Airandere Valley above Kostenetz. In both places they frequented wet grassy spots at about 7000 feet, among the dense scrub of *Pinus pumilio*, which grows more luxuriantly in the Rilo Dagh at 6000—8000 feet than in the Alps of Austria, and often forms an impenetrable thicket. Its habits and manner of flight were so different from that of *gorge* that we could not believe it to be a form of that species, and only after comparison of the clasps with those of *gorgone* I am obliged to consider it as a local form of that species. In size and appearance the males resemble those of *gorgone* from the Pyrenees more than *gorge*, but though we did everything in our power to get a series, the continued bad weather made it impossible, and without knowing the female I cannot say whether it has good claims to specific distinction.

Since writing the above Dr. Staudinger has lent me a pair of the same species taken by Haberhauer in Rilo Dagh (though sent as from the Balkans) many years ago. The male is exactly like ours; the female resembles that

of *gorgone* more than that of *gorge*, but the veins below are not so white as in that species.*

93. *E. æthiops*, Esp.

We left the country before the proper season for this insect, which I did not see myself, but Mrs. Nicholl took one at Kostenec which she did not preserve.

94. *E. ligea*, L.

Common at the foot of the mountains and up to about 4000 feet in the first half of July. The specimens large, and typical *ligea*.

95. *E. euryale*, Esp.

Very abundant in the forest from about 4000 feet, where it just overlapped the range of *ligea*, up to about 7000 feet during July. There was little or no variation among them, and not the least difficulty in distinguishing them on the wing from *ligea*. As far as I can see it is only in Scandinavia, North Russia and Siberia where there is any difficulty in distinguishing *euryale* from *ligea*.

96. *Satyrus semele*, L.

Whether we were too early for this genus or whether the unusually wet season had retarded their appearance I cannot say, but up to July 20th no species of the genus had made its appearance in the Rilo Dagh; but Mrs. Nicholl caught one of this species on June 4th at Slivno.

97. *S. dryas*, Scop.

This was common on the north side of the Balkans at the end of July, but not seen in the Rilo Dagh.

98. *Pararge mæra*, L.

Common in the Rilo up to about 4000 feet. The specimens come very near, except in size, to *hiera*. When a large number of *mæra* are examined the extent of variation is astonishing, some from Sweden and Norway being hardly distinguishable from *hiera*.

* I saw a worn specimen of this species, said to have been taken somewhere in the Balkans, in the Sofia Museum in 1900.

99. *P. egeria*, L.

Seen in the foothills, but too much worn to be worth preserving. It seemed to be the northern form.

100. *P. hiera*, F.

A very common insect in June in the Rilo Dagh at about 5000—6000 feet, and still flying, though in a very worn condition, in July. This seems to be the most southern locality in Europe where *hiera* has yet been found.

101. *P. megæra*, L.

Not common in the foothills at 3000 feet.

102. *Epinephele lycaon*, Rott.

Not common at Kostenetz, and taken in the Balkans.

103. *E. janira*, L.

Common at 3000—4000 feet in July.

104. *E. tithonus*, L.

A few seen in the Balkans in the end of July.

105. *E. hyperanthus*, L.

Appeared in July in the lower parts of the mountains.

106. *Cœnonympha leander*, Esp.

Very common early in June at Slivno and on the hills near Sofia; not so common in the Rilo Dagh up to about 4000 feet. There is considerable variation in both sexes.

107. *C. iphis*, Schiff.

Not uncommon in the foothills at 3000—4000 feet.

108. *C. arcania*, L.

With the last, and equally abundant.

109. *C. pamphilus*, L.

Not so common as the last two species in similar situations.

110. *C. tiphon*, var. *rhodopensis*, n. var.

This butterfly was very common in Rilo Dagh from about 4000 to at least 7000 feet, and was not confined to particular habitats, though commonest on wet mountain meadows. It was out in the middle of June, and fresh specimens could be got a month later. On comparing them with my numerous specimens of *tiphon* from all parts of Europe and Asia I find that they differ from normal European specimens in having in most cases the apical band of fore-wing below obsolete, but some specimens (about one third) show a trace of this band, and some of these cannot be distinguished from two specimens of *tiphon* from Stettin, and are also very close to, but much larger and darker than, what I took in the Altai Mountains (*cf.* Trans. Ent. Soc., 1899, p. 363).

On sending a specimen of the Rilo form to Dr. Staudinger he writes as follows—"Here you have found something really interesting. This specimen agrees with four or five males that I received many years ago from Haberhauer from the Caucasus without exact habitat. I have described it as *symphita*, Led., var. *tiphonides*, and from these specimens consider *symphita* (which I received in quantity from Achalzich in Armenia) also as a probable form of *tiphon*." As to the identity of *tiphon* and *symphita* my specimens of the latter are not sufficient to enable me to judge, but certainly the Bulgarian form is, on account of the grey patch on hind-wing below, much nearer to *tiphon* than to *symphita*, which (in the specimens I have) wants this patch entirely.

111. *Spilothyrus lavateræ*, Esp.

Taken at Slivno, but not seen in Rilo Dagh.

112. *Syricthus sidæ*, Esp.

Not uncommon at Rilo at 3000—4000 feet in the end of June; and also at Slivno.

113. *S. carthami*, Hüb.

I took a single specimen only.

114. *S. serratulæ*, Rmbr.

Common in the foothills up to about 4000 feet.

115. *S. cacaliæ*, Rmbr.

This species, which as far as I know has not been hitherto found east of the Alps, was not abundant, but fairly distributed at high elevations, 6500—8000 feet, at the end of June, and was the only *Hesperiid* at that elevation.

116. *S. malvæ*, L.

Common at 4000—6000 feet.

117. *S. orbifer*, Hüb.

Taken by Mrs. Nicholl at Slivno.

118. *Nisoniades tages*, L.

Not common in the foothills of Rilo Dagh.

119. *Hesperia thaumas*, Hüf.

With the last; not abundant.

120. *H. sylvanus*, Esp.

Not abundant, but more so than the last.

121. *Carterocephalus palæmon*, Pall.

Not uncommon in damp places in Rilo Dagh at 4000—5000 feet, and nearly over at the end of June.

Explanation of Plate IV.

[*See Explanation facing the* Plate.]

[Plate IV. not being ready for publication, will appear in a later Part of the Transactions.]